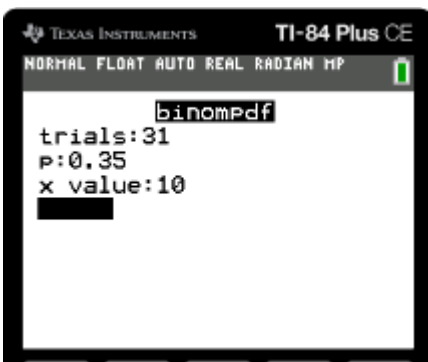
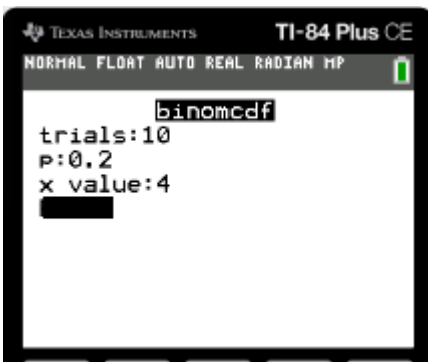
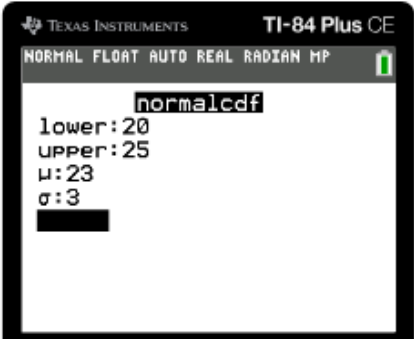
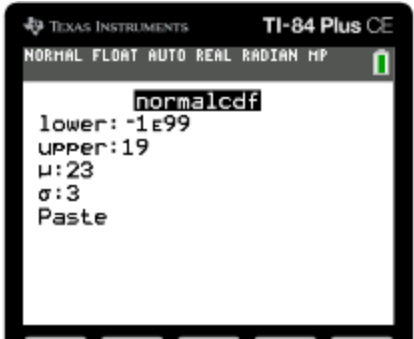
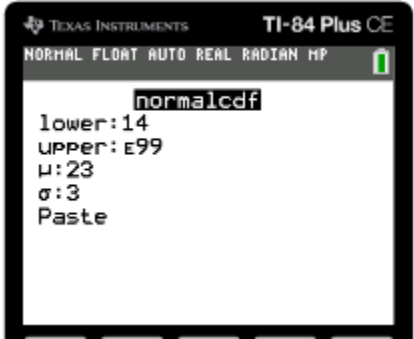
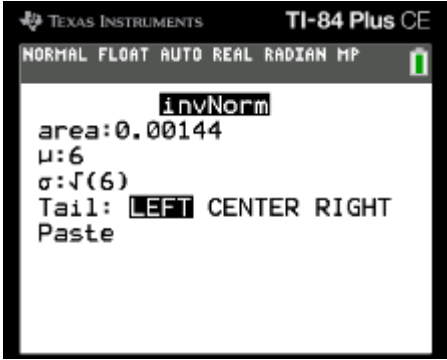
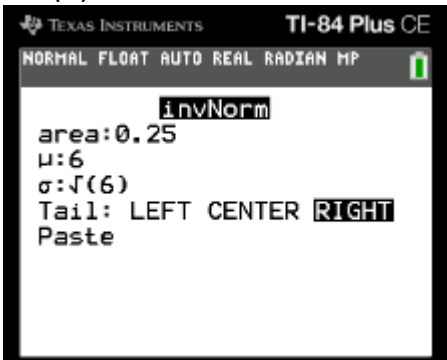
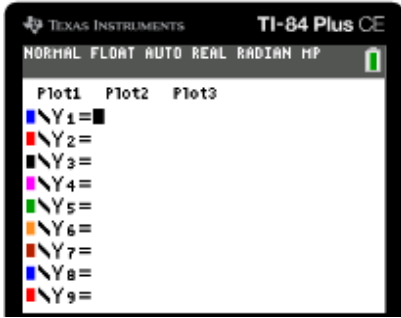
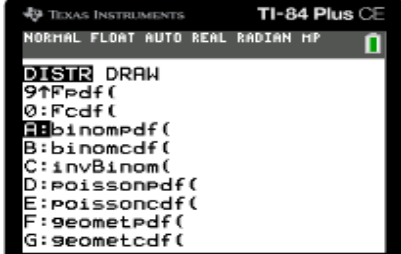


Title	H2 Mathematics – Use of Graphing Calculators to Deal with Probability Distributions [TI-84 Plus CE]
Author	AprilDolphin
Date	8/3/2025

To get into the probability distribution functionality in TI-84 Plus CE Graphing calculator, press “2ND” button, followed by “VAR” button, if the required probability distributions doesn’t appear, please press the down arrow key repeatedly to scroll down on your graphing calculator until they appear on the calculator.

Name of Functionality	Use Case & Examples
“binompdf”  Mathematically, the “binompdf” functionality does the following: $P(X = x) = \binom{n}{x} p^x (1 - p)^{n-x}$	Find the probability in a binomial distribution of obtaining outcome (Binomial Distribution has 2 outcomes, one being called “outcome”, the other being called “complement outcome”) for a specific x number of trials out of n number of random samples. How to use it in a question: In a particular country, the probability that it rains on any particular day of May is 0.35. Find the probability that it will rain exactly 10 days in May. Since May has 31 days in total, the probability of rain is 0.35 and we are finding the probability that it will rain exactly 10 days in May. We already identified the value for number of trials $n = 31$, x value = 10 and $p = 0.35$.
“binomcdf”  Mathematically, the “binomcdf” functionality does the following:	Find the sum of probability in a binomial distribution of obtaining outcome from 0 all the way to x number of trials out of n number of random samples. How to use it in a question: An archer has a probability of p of hitting the bull’s eyes every time he shoots. He shoots 10 arrows. Find the probability that the archer hits the bull’s eyes <u>at most 4 times</u>, given $p = 0.2$. Since the archer in question shoot $n = 10$ arrows, the probability of hitting the bull’s eye

$P(X \leq x) = \binom{n}{0} p^0 (1-p)^{n-0} +$ $\binom{n}{1} p^1 (1-p)^{n-1} \dots$ $\binom{n}{x} p^x (1-p)^{n-x}$	mentioned is $p = 0.2$ and the question demanded the probability of hitting the bull's eye at <u>most 4 times</u>, we identified the values for $n = 10$, $x = 4$ and $p = 0.2$.
"normalcdf" (a)  (b)  (c) 	Find the probability of obtaining any range of value in a normal distribution, given a lower limit, upper limit, mean μ and standard deviation σ. [Be very careful when inputting values of <u>standard deviation</u> into the graphing calculator, typical question and normal distribution notation gives the variance of the normal distribution which is σ^2 i.e. $X \sim (\mu, \sigma^2)$] To input a value of "negative infinity" into the normal distribution probability calculation functionality, key in $-1E99$ or $-E99$. To input a value of "positive infinity" into the normal distribution probability calculation functionality, key in $1E99$ or $E99$. (Do not key in E99 or -E99 using the alphabet function of graphing calculator. The two ways to input the correct [E] are given as below. Press [2ND] button, followed by [,] button <u>OR</u> Press [2ND] button, followed by the [0] button and scroll down for the correct [E].) Given that $X \sim N(23,9)$, find the following probabilities. $P(20 < X \leq 25)$ $P(X < 19)$ $P(X \geq 14)$

invNorm (a)  (b) 	Given the probability value p (which is also the area under curve), mean μ and standard deviation σ, find the value that can satisfy the probability distribution. In mathematical terms, it meant you are given the following parameters. $P(X < a)$ or $P(X > a)$, μ and σ and you are supposed to find the value x. Given that $W \sim N(6,6)$, find the value of a or the range of values of a for each of the following. (a) $P(W < a) = 0.00144$ (b) $P(W \geq a) = 0.25$ Note: if $X \sim N(\mu, \sigma^2)$ and you are supposed to find $P(X < a)$, it is left tail. If $X \sim N(\mu, \sigma^2)$ and you are supposed to find $P(X > a)$, then it is right tail.
Description of Functionality	Steps and Further Explanation
Finding the mode (most frequently occurring value) of a binomial distribution.	Step 1. Press [Y=] key.  Step 2. Press [2ND] key followed by [VAR] key. 

Step 3. Scroll down all the way till you see the cursor on “binompdf” and press the [Enter] key.
 Step 4. Key in required parameters such as n (trials), p (probability) and x-value (In this case, we key in x-value with letter X using the alphabet functionality on the graphing calculator by pressing [ALPHA] and [STO] and pressing [Enter].



Step 5. Press down until the graphing calculator’s cursor is at “Paste” and press [ENTER].
 Step 6. Press [2ND] and Press [GRAPH] on graphing calculator and a table should appear.

The image shows the TI-84 Plus CE calculator screen displaying a table of binomial probabilities. The table has two columns: X and Y1. The values for X range from 2 to 12, and the values for Y1 are the corresponding probabilities. The cursor is at the bottom of the table, and the value X=2 is displayed below the table.

X	Y1
2	0.0161
3	0.0537
4	0.1208
5	0.1934
6	0.2256
7	0.1934
8	0.1208
9	0.0537
10	0.0161
11	0.0029
12	2.4E-4

X=2

Step 7. Find the mode by searching for the value(s) with highest probability.

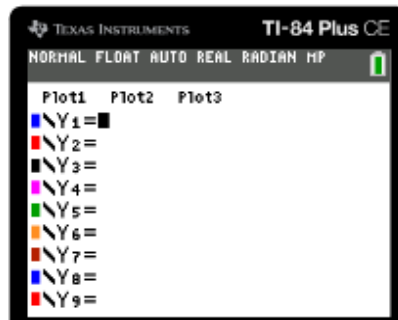
The image shows the TI-84 Plus CE calculator screen displaying a table of binomial probabilities. The table has two columns: X and Y1. The values for X range from 1 to 11, and the values for Y1 are the corresponding probabilities. The cursor is at the bottom of the table, and the value X=6 is displayed below the table.

X	Y1
1	0.0029
2	0.0161
3	0.0537
4	0.1208
5	0.1934
6	0.2256
7	0.1934
8	0.1208
9	0.0537
10	0.0161
11	0.0029

X=6

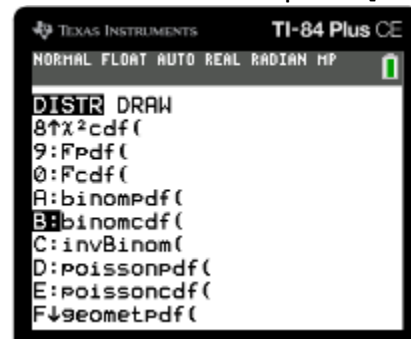
Finding the least value of an unknown of a Binomial Distribution.
[e.g. if $X \sim B(15, 0.8)$, find the least value of r such that $P(X \leq r) > 0.80$]

Step 1. Press [Y=] button

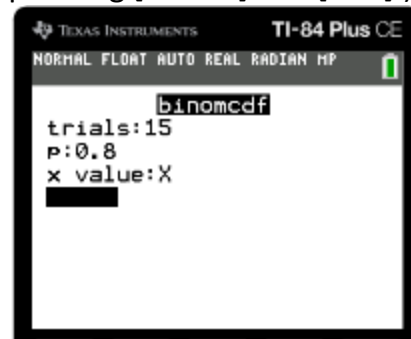


Step 2. Press [2ND] followed by [VAR] button

Step 3. Scroll down all the way until the cursor is on “binomcdf” and press [Enter].



Step 4. Key in required parameters such as n (trials), p (probability) and x -value (In this case, we key in x -value with letter X using the alphabet functionality on the graphing calculator by pressing [ALPHA] and [STO].)



Step 5. Press down until the graphing calculator’s cursor is at “Paste” and press [ENTER].

Step 6. Press [2ND] and Press [GRAPH] on graphing calculator and a table should appear.

TEXAS INSTRUMENTS TI-84 Plus CE

NORMAL FLOAT AUTO REAL Radian HP
PRESS + FOR ΔTb1

X	Y1				
0	3E+11				
1	2E+9				
2	5.7E+8				
3	1E+6				
4	1.2E+5				
5	1.1E+4				
6	7.8E+4				
7	0.0042				
8	0.0181				
9	0.0611				
10	0.1642				

X=0

Step 7. Find the least value that can satisfy the condition by scrolling down and looking for the least value that just exceed 0.80.

TEXAS INSTRUMENTS TI-84 Plus CE

NORMAL FLOAT AUTO REAL Radian HP
PRESS + FOR ΔTb1

X	Y1				
5	1.1E+4				
6	7.8E+4				
7	0.0042				
8	0.0181				
9	0.0611				
10	0.1642				
11	0.3518				
12	0.602				
13	0.8329				
14	0.9648				
15	1				

X=13